

U.S. Patent Application Serial No. 10/516,296
Amendment filed February 2, 2009
Reply to OA dated October 1, 2008

REMARKS

By the present amendment, the specification has been amended to correct an apparent typographical error with respect to the citation of a particular publication. The applicants respectfully submit that no new matter has been added. Further, it is believed that this Amendment is fully responsive to the Office Action dated October 1, 2008. Entry of this amendment is respectfully requested.

As set forth above, the applicants respectfully submit that the amendment to the specification obviates the objection to the specification. Accordingly, withdrawal of the objection to the specification is respectfully solicited.

In the Office Action, claims 1-4 and 14 were rejected under 35 USC § 102(b) as being anticipated over the cited EP patent publication to Watanabe et al. In addition, claims 5-9, 12 and 13 were rejected under 35 USC § 103(a) as being unpatentable over the same patent publication to Watanabe et al. Reconsideration of these rejections in view of the following comments is respectfully requested.

In making the subject rejection, it was asserted that the Watanabe et al. publication discloses a molten salt electrolyte comprising a single or a combination of compounds, and compounds Y1 and

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Y2 read on compounds I and II. Referring to a court decision, it was stated that the compounds of the invention are identical to the compounds disclosed therein because the reference teaches the same compounds, even if the reference does not disclose the properties (advantageous effect) thereof.

In response to the above assertions, it is to be noted that it is a particular feature of the molten salt of the present claim 1 lies in that it comprises “a mixture of two or more organic salts with different anionic moieties and different organic cationic moieties.” With this feature, the molten salt mixture exhibits a markedly lower solidifying point than that of any of the individual organic salts. It is submitted that such a salt is not taught or suggested by the cited publication to Watanabe et al.

On the other hand, the Watanabe et al. publication only mentions examples of molten salts on pages 16 to 22, and teaches on page 16, paragraph [0079] that a mixture of two or more molten salts may be used. Example 4 of Watanabe et al. publication, which is the only specific Example, discloses a single molten salt (1-methyl-3-hexylimidazolium iodide).

Thus, the Watanabe et al. publication, does not teach or suggest a molten salt mixture “comprising a mixture of two or more organic salts with different anionic moieties and different organic cationic moieties.” It is therefore submitted that the subject matter of claim 1 patentably distinguishes over the Watanabe et al. publication.

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Moreover, Watanabe et al. publication merely discloses the use of a mixture of two or more molten salts, and is totally silent about mixing “two or more organic salts with different anionic moieties and different organic cationic moieties.” Hence, the Watanabe et al. publication does not provide any reasonable motivation that would lead to the subject matter of present claim 1.

Furthermore, the molten salt of claim 1 exhibits a distinguishing effect, i.e., a markedly lower solidifying point than that of any of the individual organic salts. This effect can be easily understood by comparing the results of Examples 1 to 9 and the results of Comparative Examples 1 to 4 described from page 36, line 11, to page 43, line 15, summarized in the attached Examples 1-9 and Comparative Examples 1-4.

This distinguishing effect is difficult to expect from the Watanabe et al. publication. Accordingly, it is therefore submitted that the subject matter of claim 1 is unobvious over the publication to Watanabe et al. Inasmuch as claims 2 to 4 and 14 depend upon claim 1, it is submitted that the subject matter of these claims is also unobvious.

As discussed previously, it is believed that the subject matter of claim 1 is unobvious over the disclosure of the Watanabe et al. publication, and, as a consequence, it is submitted that claims 5-9, 12 and 13 are also unobvious over the same publication.

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In addition to the distinctions set forth above relative to the disclosure of the Watanabe et al. publication, it is further noted that there is following difference in addition to the above. A feature of the molten salt as defined by claim 5 lies in that it comprises a mixture of two or more organic salts represented by formulae (V) and (VI) with different organic anionic moieties and different organic cationic moieties, and that R⁶ and R¹¹ are each an alkyl group in which at least one hydrogen atom is substituted by a fluorine atom. In this regard, specific attention is directed to Examples 1 to 7 in the attached Examples 1-9 and Comparative Examples 1-4.

Although the publication to Watanabe et al. mentions examples of molten salts on pages 16 to 22, none of the substituents for these molten salts contains fluorine. That is to say, the Watanabe et al publication neither teaches nor suggests the organic salts represented by formulae (V) and (VI) as defined by claim 5, wherein the substituents R⁶ and R¹¹ are each an alkyl group in which at least one hydrogen atom is substituted by a fluorine atom. Moreover, the fact that the molten salt of a mixture of these salts has a markedly lower solidifying point than that of any of the individual organic salts is difficult to expect from the Watanabe et al publication is a strong indication of the unobviousness of the subject matter of claim 5. As such, it is submitted that the subject matter of claims 9, 12 and 13 that depend upon Claim 5 are also unobvious.

For the reasons stated above, withdrawal of the rejection under 35 U.S.C. § 103(a) and

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allowance of claims 1-9 and 13-15 over the cited publication are respectfully requested.

Claims 10 and 11 are currently withdrawn from consideration in the present examination. However, as stated in the original specification, claim 1 requires that two or more (including three, four, five...) organic salts be selected from any of compounds I to IV. For instance, when five organic salts are used, it is possible that two or more different compounds are selected from compounds represented by the same formula.

Further, although the current Claim 5 recites compounds V and VI, according to the species of the Restriction Requirement as set forth previously, the scope of Examples 1 to 3 and 5 to 8 (a mixture of two or three pyridiniums) cannot be encompassed at all in this application. As such, the species restriction imposed not lead to proper protection of the invention. It is therefore requested that current Claims 10 and 11 be also examined in the subject application. If such is to be denied, it is further requested that justification for this action be provided to applicant.

Furthermore, in the event the examiner finds the subject application in condition for allowance, it is respectfully requested that process claims 15-18, which have been withdrawn from consideration, be rejoined in the present application.

If, for any reason, it is felt that this application is not now in condition for allowance, the

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Examiner is requested to contact the applicants undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Petition for Extension of Time
Examples 1-9, Comparative Examples 1-4

Examples 1 to 9

	Organic Salt 1	Organic Salt 2	Organic Salt 3	Solidifying Point
Example 1	 CF_3SO_3^- mp 67.7-68.9°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	—	-87.0°C
Example 2	 CF_3SO_3^- mp 100-101°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	—	-60.0°C
Example 3	 CF_3SO_3^- $\text{CH}_2\text{CF}_2\text{CF}_2\text{H}$ mp 79.0-80.5°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	—	-78.7°C
Example 4	 CF_3SO_3^- mp 51.0-51.9°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	—	-85.0°C
Example 5	 CF_3SO_3^- mp 67.7-68.9°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 60.3-61.1°C	—	-72.7°C
Example 6	 CF_3SO_3^- $\text{CH}_2\text{CF}_2\text{CF}_2\text{H}$ mp 79.0-80.5°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 60.3-61.1°C	—	-72.8°C
Example 7	 CF_3SO_3^- mp 67.7-68.9°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 60.3-61.1°C	< -90.0°C
Example 8	 CF_3SO_3^- mp -39°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp 38.3-38.8°C	—	< -90.0°C
Example 9	 CF_3SO_3^- mp -39°C	 $(\text{CF}_3\text{SO}_2)_2\text{N}^-$ CH_2CF_3 mp -66°C	—	< -90.0°C

Comparative Examples 1 to 4

	Organic Salt 1	Organic Salt 2	Solidifying Point
Comparative Example 1	 mp 67.7-68.9°C	 mp 100-101°C	> 20°C
Comparative Example 2	 mp 65.0-66.5°C	 mp 100-101°C	> 20°C
Comparative Example 3	 mp 60.3-61.1°C	 mp 38.3-38.8°C	> 20°C
Comparative Example 4	 mp 100-101°C	 mp 60.3-61.1°C	> 20°C